**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**International General Certificate of Secondary Education**

# MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

## 0581 MATHEMATICS

**0581/31** Paper 3 (Core), maximum raw mark 104

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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**Abbreviations**

cao correct answer only
cso correct solution only
dep dependent
ft follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
www without wrong working
art anything rounding to
soi seen or implied

| Qu. | Answers | Mark | Part Marks |
|---|---|---|---|
| **1** | **(a)** **(i)** 84 cao | 1 | |
| | **(ii)** 31 or 37 cao | 1 | |
| | **(iii)** 121 cao | 1 | |
| | **(iv)** 125 cao | 1 | |
| | **(b)** $55\% < \frac{5}{9} < \sqrt{0.31}$ oe for each term | 2 | **M1** for all numbers written as decimals or for all numbers written as percentages |
| **2** | **(a)** 90° | 1 | |
| | (Angle between) tangent and radius/ diameter | 1 dep | |
| | **(b)** **(i)** 54° cao | 1 | |
| | **(ii)** $\frac{1}{2} \times (180 - 54)$ or $180 - 90 - {}^1/_2(180 - 126)$ or 54/2 followed by $(180 - 90 - 27$ oe$)$ | 2 | **M1** for using isosceles triangle POR or **M1** for using isosceles triangle ROS then triangle PRS |
| | **(c)** **(i)** 90° cao | 1 | |
| | **(ii)** 27° cao | 1 | |
| **3** | **(a)** **(i)** 63 | 2 | **M1** for their "378" ÷ 6 or **SC1** for 333 seen |
| | **(ii)** 38 cao | 1 | |
| | **(b)** **(i)** 1.5 cao | 1 | |
| | **(ii)** 4 | 2 | **B1** for attempt to order the numbers |
| | **(c)** 80° | 2 | **M1** for 84 ÷ their total × 360 |
| | **(d)** **(i)** 1 hour | 1 | |
| | **(ii)** 4 and a half more suns drawn | 1 | Condone size, shape of suns |
| | **(e)** **(i)** 4 correct plots | 2 | **B1** for 3 or 2 correct |
| | **(ii)** Positive | 1 | |

| | | | |
|---|---|---|---|
| **4** | **(a)** 42 | 1 | |
| | **(b)** **(i)** 60° | 1 | |
| | **(ii)** 6.06(217…) | 2 | **M1** ft for $\frac{x}{7} = \cos 30$ or $\frac{x}{7} = \sin 60$ or $\frac{x}{3.5} = \tan 60$ or $\frac{3.5}{x} = \tan 30$ or better |
| | **(c)** **(i)** 21.2 to 21.4 ft | 2ft | **M1** for $\frac{1}{2} \times 7 \times$ their **(b)(ii)** oe |
| | **(ii)** 91.4 to 91.7 ft | 2ft | **M1** ft 7 × 7 + 2 (their **(c)(i)**) or **B1** for 49 |
| **5** | **(a)** 36 (%) | 3 | **M2** for $\frac{5.1 - 3.75}{3.75} \times 100$<br>**M1** for $\frac{5.1}{3.75}$ or 136% or 1.36 or 5.1 – 3.75 implied by 1.35 |
| | **(b)** 400 | 2 | **M1** for 2.04 ÷ 5.1 implied by figs 4 |
| | **(c)** **(i)** 1.53 | 2 | **M1** for (1 – 0.7) × 5.1 oe or 5.10 – (5.10 × 0.70) |
| | **(ii)** 40.29 cao | 2 | **M1** for 7 × 5.1 + 3 × their **(c)(i)** or 35.7 + (3 × their **(c)(i)** evaluated) |
| **6** | **(a)** –1, –4, 1.3, 1 | 2 | **B1** for –1 and 1 and **B1** for –4 and 1.3 |
| | **(b)** 10 points plotted ½ small square accuracy | P3ft | **P2** for 8 or 9 points, **P1** for 5 or 6 or 7 points |
| | smooth correct curves not across *y*-axis | C1 | |
| | **(c)** –1.6 correct or ft | 1ft | ft from their graph |
| | **(d)** **(i)** $y = 5$ drawn | 1 | |
| | **(ii)** ($x =$) 0.8 correct or ft | 1ft | ft from their graph |
| | **(e)** **(i)** Ruled line drawn from (–0.5, –8) to (2, 2) | 2 | **B1** for ruled line drawn from either point not horizontal or vertical |
| | **(ii)** 4 cao | 1 | |
| | **(iii)** $y = 4x - 6$ or $y =$ their **(e)(ii)** $x +$ their intercept or $y = 4x +$ their intercept | 2ft | **B1** ft $y = 4x + k$ or $y =$ their **(e)(ii)** $x + k$ or $y = jx - 6$ or $y = jx +$ their intercept |
| **7** | **(a)** 0.5 or 1/2 | 2 | **M1** for collecting terms correctly |
| | **(b)** $6x - 34y$ or $2(3x - 17y)$ | 2 | **B1** for $21x - 28y$ or **B1** for $-15x - 6y$ or **B1** for $6x$ or **B1** for $-34y$ |
| | **(c)** $3g^2(2 - g)$ cao | 2 | **B1** for correct partial factorising |

| | | | |
|---|---|---|---|
| **8** | **(a) (i)** Rotated 180° about origin | 2 | **B1** for correct shape and orientation in wro position |
| | **(ii)** Reflected in $y = 3$ | 2 | **B1** for reflection in $x = 3$ or $y = k$ |
| | **(iii)** Translated by $\begin{pmatrix} -5 \\ 3 \end{pmatrix}$ | 2 | **B1** for translation by $\begin{pmatrix} -5 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 3 \end{pmatrix}$ or $\begin{pmatrix} 3 \\ -5 \end{pmatrix}$ |
| | **(b) (i)** Reflection | 1 | |
| | $x = -1$ | 1 | |
| | **(ii)** Enlargement only | 1 | **B1** for each |
| | (sf) 3 | 1 | Independent |
| | (centre) (1, 3) | 1 | Independent |
| **9** | **(a)** 248 art | 3 | **M2** for $\sqrt{325^2 - 210^2}$ or better<br>**M1** for $325^2 = x^2 + 210^2$ or better |
| | **(b) (i)** 40.3° art | 2 | **M1** sin = 210 ÷ 325 or cos = $\frac{\text{their (a)}}{325}$ or tan = $\frac{210}{\text{their (a)}}$ |
| | **(ii)** 319.7(5)° or 320° | 2ft | **M1** for 360 – their **(b)(i)** |
| | **(c) (i)** 28 | 2 | **B1** for (time =) 7.5 or 7.30 or<br>**M1** for 210 ÷ their 7.5 |
| | **(ii)** 8h 47min | 3 | **M1** for 325 ÷ 37<br>**A1** for 8.78(37…)<br>**B1** independent converting decimal time to minutes |
| | **(iii)** 22 47 or 10 47 pm | 1ft | ft 1400 + their **(c)(ii)** |
| **10** | **(a)** 5 by 5 shape | 1 | |
| | **(b)** First row 25 2500 $n^2$ | 1, 1, 1 | Independent |
| | Second row 1 1 1 | 1 | All three |
| | Third row 24 2499 $n^2 - 1$ | 1, 1, 1 | Independent |
| | **(c)** 100 | 1 | |
| **11** | **(a)** 8 | 1 | |
| | **(b) (i)** 355 | 2 | **M1** for $8 \times 40 + 35$ seen or better |
| | **(ii)** 33 | 3 | **M2** for $\frac{(288 - 24)}{8}$ or **B1** for 264 seen |
| | **(c)** $t = \frac{p - k}{8}$ | 2 | **B1** mark for a correct step |